Trend Study 16C-6-02

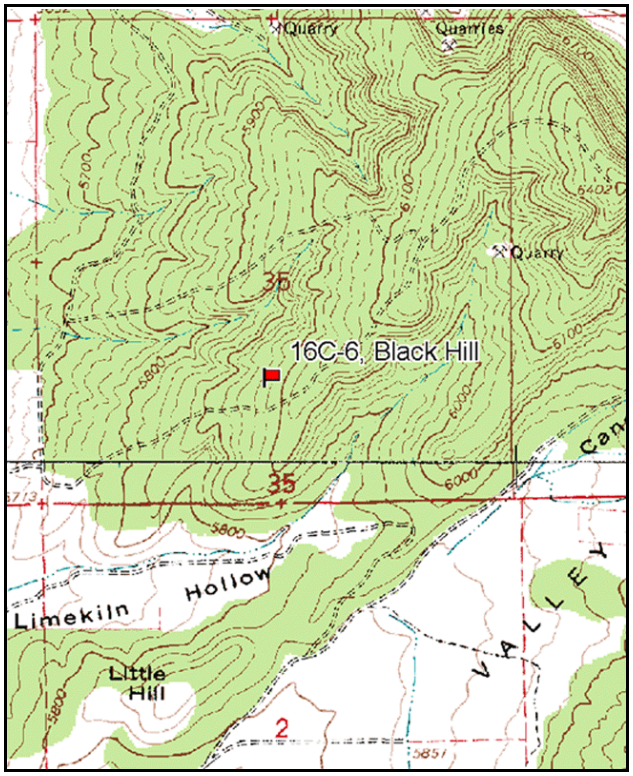
Study site name: Black Hill . Vegetation type: Chained, Seeded P-J .

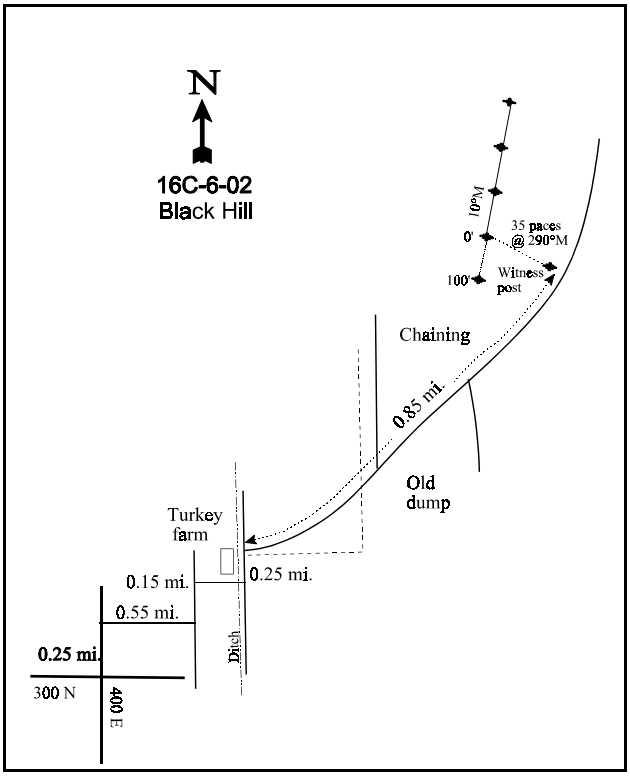
Compass bearing: frequency baseline 190 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 3 on 2ft.

LOCATION DESCRIPTION

From the intersection of 300 North and 400 East in Ephraim, go north on 400 East for 0.25 miles. Just before the white brick home, turn east and go 0.55 miles. From here, bear left and then right, going 0.15 miles to where the road crosses the Gobble field ditch on the south side of a turkey pen. Cross the ditch and turn left (north) for 0.25 miles. Turn right here and go 0.85 miles into the chaining where you will come to a 4 foot, green witness post on the west side of the road. Stop here and walk 35 paces westward at 290 degrees magnetic to the 0-foot baseline stake marked by browse tag # 427.





Map Name: Chester

Diagrammatic Sketch

Township 16S , Range 3E , Section 35

GPS: NAD 27, UTM 12S 4358578 N 452497 E

DISCUSSION

Black Hill - Trend Study No. 16C-6

The Black Hill study is located on a chained and seeded juniper site northeast of Ephraim. The site is located on Division land above several turkey farms, pastures, and alfalfa fields. The Black Hills drop sharply down to Cane Valley on the east, but slope moderately to the west. The site is on a 16%, west facing slope at an elevation of 6,075 feet. In 1987, a chain was used to mechanically eliminate the juniper on the site. The site was also seeded as part of the treatment. The area was previously characterized as an open stand of juniper with a sparse understory of black sagebrush in association with cheatgrass. Patches of juniper were left on the ridge for cover and travel corridors for big game. Most of the big game use on this site comes from wintering deer. Pellet group transect data taken in 2002 estimated moderate deer use of 66 deer days use/acre (164 ddu/ha) and light elk use at 13 elk days use/acre (33 edu/ha). Livestock also graze the area during the summer. Cow use was estimated at 11 days use/acre (27 cdu/ha) in 2002.

This site is limited by the more shallow soils and lower annual precipitation compared to the nearby Cane Valley study. The soil is described as Amtoft flaggy loam which characteristically are 12-18 inches deep over limestone. Therefore, the root zone may be somewhat restricted. Effective rooting depth at the site was estimated at about 10 inches. Soil textural analysis indicates a clay loam with a neutral to slightly alkaline reactivity (pH = 7.3). Erosion hazard is considered moderate, but with appreciable litter buildup and the abundance of seeded grasses, erosion is minimal. Rock and pavement combined cover are moderate at 12% in 2002. Bare soil was also moderate at 18% in 2002, a slight increase from 13% in 1997. The erosion condition class assessment was determined to be stable in 2002.

As with the Cane Valley study, palatable browse is limited on this site. Black sagebrush, Wyoming big sagebrush, four-wing saltbush, and bitterbrush are all present, but only black sagebrush is moderately abundant. Black sagebrush density was estimated at 760 plants/acre in 2002. Reproduction declined in 2002, probably due to drought conditions, but decadence was low at 16%, vigor was mostly normal, and use was moderate. Wyoming big sagebrush density was estimated at 440 plants/acre in 1997, but only 40 plants/acre in 2002. Apparently, most of the plants classified as Wyoming big sagebrush in 1997 were classified as black sage in 2002. The growth form of Wyoming big sagebrush on this site is low and many of the plants displayed characteristics of black sagebrush. It is likely that many of the sagebrush on the site are hybrids between Wyoming big sagebrush and black sage. Total sagebrush density between 1997 and 2002 is nearly unchanged.

The junipers on the ridge surrounding the study have been highlined. Juniper density on the study site was estimated at 77 trees/acre in 2002, a slight increase from 69 trees/acre in 1997. A small proportion of the trees are survivors from the treatment but many were young trees in the 2 to 3 foot size class. Average diameter of juniper was estimated at only 3 inches. Low rabbitbrush is the most common shrub on the study site with a density of about 2,500 plants/acre in 2002. It had very poor vigor in 1989 due to moisture stress, but showed mostly normal vigor in 1997 and 2002.

Perennial grasses, both seeded and native, dominant the vegetative community. Perennial grasses contributed 48% of the total vegetative cover in 1997, increasing to 65% in 2002. Intermediate wheatgrass is the most abundant species significantly increasing in nested frequency in 2002. Crested wheatgrass, Indian ricegrass, and muttongrass are moderately abundant. As a group, perennial grass sum of nested frequency declined by 7% in 2002 with drought conditions. Grasses appeared to have been grazed by cattle prior to sampling in 2002, but with abundant litter and wolfy material on many plants, grazing has not been a problem in the past. Cheatgrass was moderately abundant in 1997 with a nested frequency of 181 (400 maximum) and a quadrat frequency of 61%. In 2002, cheatgrass was sampled in only 20 quadrats and nested frequency declined significantly. The decline in cheatgrass abundance is not unexpected during drought as was the case in 2002.

Forbs, especially perennial species, have not been significant in the understory since the site was established. Annual species were moderately abundant in 1997, but drastically declined in 2002 with drought. Perennial forbs were sampled in only four total quadrats in 2002. Small burnet, a seeded species, was moderately abundant in 1989, but has since disappeared from the site. Bur buttercup is currently (‘02) the most abundant forb on the site.

1989 APPARENT TREND ASSESSMENT

This recently treated area has not yet reached its potential, especially with the poor moisture conditions in the years since the treatment. Site potential is limited, and black sagebrush will likely become the predominant browse because of the shallow soils. Grasses and forbs are clearly an important component on this range for spring and fall big game use. Site management objectives should include the increase of the perennial species to more competitively exclude weedy annuals and cheatgrass. Soils appear to be stable to improving with increasing ground cover.

1997 TREND ASSESSMENT

Trend for soil is up. Percent bare soil declined to 13%, and herbaceous cover continues to increase. Cover contributed by herbaceous species is better for protecting soils from high intensity summer storms. The two preferred browse species for this site are black sagebrush and Wyoming big sagebrush which are almost equal in abundance, 420 and 440 plants/acre respectively. The much better sampling design is responsible for the more accurate estimates of sagebrush density. Percent decadence is low and vigor is good. Trend for browse is stable. The herbaceous understory is more difficult to determine because of the abundance of weedy species. The trend for perennial species is improving, but weedy species should be monitored closely for population trends of three species, cheatgrass, pale alyssum, and bur buttercup. These species currently contribute 21% of the total vegetative cover.

TREND ASSESSMENT
soil - up (5)
browse - stable (3)
herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Soil trend is stable. Although percent bare soil increased in 2002, herbaceous vegetation dominates the site. Vegetation and litter cover are well disbursed and effectively limit erosion. The ratio of protective cover (vegetation, litter, and cryptogams) to bare soil remains good at almost 4:1. Trend for browse is stable. In 1997, Wyoming big sagebrush and black sagebrush were estimated at nearly identical densities. In 2002, most of the sagebrush on the site was classified as black sagebrush. Overall sagebrush density is stable, use is moderate, vigor is mostly normal, and decadence is low at 16%. Trend for the herbaceous understory is stable as perennial grasses remain dominant and only slightly decreased in sum of nested frequency in 2002. Intermediate wheatgrass, the most abundant species, significantly increased in 2002.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron cristatum	$_{a}$16	$_{ab}$34	$_{b}$52	9	17	23	1.50	2.34
G	Agropyron intermedium	$_{a}$93	$_{b}$178	$_{c}$225	37	64	78	12.55	16.99
G	Agropyron spicatum	-	-	-	-	-	-	.00	-
G	Bromus inermis	-	3	-	-	1	-	.03	-
G	Bromus tectorum (a)	-	$_{b}$181	$_{a}$52	-	61	20	1.98	.34
G	Elymus junceus	-	4	4	-	3	2	.21	.03
G	Oryzopsis hymenoides	$_{ab}$52	$_{b}$90	$_{a}$35	24	34	14	1.21	1.47
G	Poa fendleriana	1	-	-	1	-	-	-	-
G	Poa pratensis	1	-	-	1	-	-	-	-
G	Poa secunda	$_{a}$9	$_{b}$44	$_{b}$43	5	17	16	.16	.26
G	Sitanion hystrix	$_{b}$46	$_{b}$39	$_{a}$6	22	21	3	1.14	.07
Total for Annual Grasses		0	181	52	0	61	20	1.98	0.34
Total for Perennial Grasses		218	392	365	99	157	136	16.81	21.18
Total for Grasses		218	573	417	99	218	156	18.80	21.52
F	Alyssum alyssoides (a)	-	$_{b}$271	$_{a}$32	-	87	16	1.96	.10
F	Allium spp.	-	-	7	-	-	2	-	.01
F	Arabis spp.	-	3	-	-	1	-	.03	-
F	Astragalus spp.	3	-	-	1	-	-	-	-
F	Camelina microcarpa (a)	-	5	-	-	2	-	.01	-
F	Chenopodium album (a)	-	1	-	-	1	-	.00	-
F	Cirsium spp.	6	-	-	2	-	-	-	-
F	Cymopterus spp.	-	1	-	-	1	-	.00	-
F	Lactuca serriola	$_{b}$14	$_{ab}$4	$_{a}$-	5	2	-	.01	-
F	Linum lewisii	1	2	-	1	1	-	.03	-
F	Mentzelia albicaulis (a)	-	3	-	-	1	-	.03	-
F	Medicago sativa	7	2	-	4	2	-	.04	-
F	Phlox longifolia	-	2	1	-	1	1	.00	.00
F	Ranunculus testiculatus (a)	-	$_{b}$272	$_{a}$193	-	86	66	3.46	2.81
F	Sanguisorba minor	$_{c}$88	$_{b}$15	$_{a}$-	40	5	-	1.12	-
F	Sisymbrium altissimum (a)	3	3	-	1	1	-	.41	-
F	Sphaeralcea coccinea	-	1	1	-	1	1	.03	.00
F	Trifolium douglasii	-	3	-	-	2	-	.06	-
F	Tragopogon dubius	3	6	-	2	4	-	.04	-
Total for Annual Forbs		3	555	225	1	178	82	5.87	2.91
Total for Perennial Forbs		122	39	9	55	20	4	1.39	0.01
Total for Forbs		125	594	234	56	198	86	7.27	2.93

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 6

Type	Species	Strip Frequency '97	Strip Frequency '02	Average Cover % '97	Average Cover % '02
B	Artemisia nova	10	21	.39	.66
B	Artemisia tridentata wyomingensis	15	2	.45	.30
B	Atriplex canescens	3	1	-	-
B	Chrysothamnus viscidiflorus stenophyllus	57	50	5.29	4.30
B	Gutierrezia sarothrae	5	7	.07	.03
B	Juniperus osteosperma	7	8	2.51	2.75
B	Opuntia spp.	0	1	-	-
Total for Browse		97	90	8.72	8.06

CANOPY COVER -- LINE INTERCEPT
Herd unit 16C, Study no: 6

Species	Percent Cover '97	Percent Cover '02
Artemisia nova	-	.92
Artemisia tridentata wyomingensis	-	.25
Atriplex canescens	-	.58
Chrysothamnus viscidiflorus stenophyllus	-	4.58
Gutierrezia sarothrae	-	.05
Juniperus osteosperma	-	3.58

Key Browse Annual Leader Growth
Herd unit 16C , Study no: 6

Species	Average leader growth (in) '02
Artemisia nova	1.4

Point-Quarter Tree Data
Herd unit 16C , Study no: 6

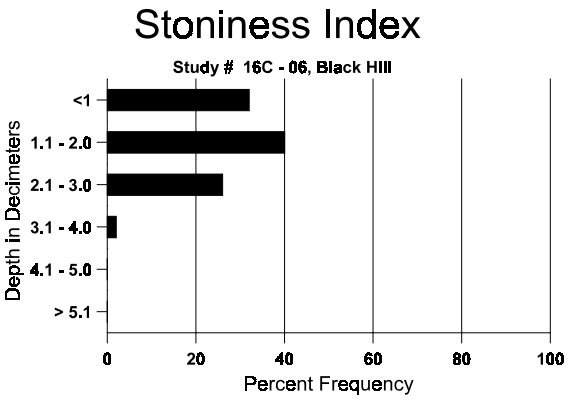
Species	Trees per Acre '97	Trees per Acre '02	Average diameter (in) '97	Average diameter (in) '02
Juniperus osteosperma	69	77	2.6	3.2

BASIC COVER --
Herd unit 16C, Study no: 6

Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'89	'97	'02
Vegetation	374	344	4.50	34.90	32.80
Rock	139	184	2.50	2.73	4.11
Pavement	237	251	13.75	4.38	7.83
Litter	378	388	63.25	40.56	50.98
Cryptogams	99	123	1.00	1.42	4.36
Bare Ground	210	232	15.00	12.78	18.33

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 06, Black Hill

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
8.5	61.6 (10.4)	7.3	36.7	34.7	28.6	4.5	13.1	160.0	.5



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 6

Type	Quadrat Frequency		Pellet Transect	
	'97	'02	Pellet Groups per Acre '02	Days Use per Acre (ha) '02
Sheep	1	-	-	-
Rabbit	12	19	-	-
Elk	1	9	174	13 (33)
Deer	40	31	861	66 (164)
Cattle	-	2	131	11 (27)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	89	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	2	-	1	-	-	-	-	-	-	3	-	-	-	100			3
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	4	6	1	-	-	-	-	-	-	10	1	-	-	366	12	12	11
	97	15	-	-	-	-	-	-	-	-	15	-	-	-	300	13	23	15
	02	12	15	5	-	-	-	-	-	-	32	-	-	-	640	10	18	32
D	89	5	3	-	-	-	-	-	-	-	7	-	1	-	266			8
	97	3	-	-	-	-	-	-	-	-	-	-	-	3	60			3
	02	4	1	1	-	-	-	-	-	-	5	-	-	1	120			6
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	41%	09%	05%	-43%
'97	00%	00%	14%	+45%
'02	42%	16%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	732	Dec:		36%
'97	420			14%
'02	760			16%

Artemisia tridentata wyomingensis																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	13	1	-	5	-	-	-	-	-	19	-	-	-	380	15	20	19
	02	1	1	-	-	-	-	-	-	-	2	-	-	-	40	19	20	2
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	05%	00%	00%	-91%
'02	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		0%
'97	440			5%
'02	40			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Atriplex canescens																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	41	21	3
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	59	57	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	-67%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	60		-
	'02	20		-

Chrysothamnus nauseosus albicaulis																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	54	85	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	38	44	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	0		-
	'02	0		-

Chrysothamnus viscidiflorus stenophyllus																		
Y	89	2	-	-	-	-	-	-	-	-	1	-	1	-	66			2
	97	20	-	-	-	-	-	-	-	-	20	-	-	-	400			20
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	35	-	-	-	-	-	-	-	-	2	-	28	5	1166	15	22	35
	97	121	-	-	1	-	-	-	-	-	122	-	-	-	2440	14	23	122
	02	105	1	-	1	-	-	-	-	-	106	1	-	-	2140	12	21	107
D	89	18	-	-	-	-	-	-	-	-	1	-	12	5	600			18
	97	4	-	-	-	-	-	-	-	-	3	-	-	1	80			4
	02	11	2	-	-	1	-	1	-	-	12	-	-	3	300			15
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	93%	+37%
'97	00%	00%	.68%	-16%
'02	03%	00%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	1832	Dec:	33%
	'97	2920		3%
	'02	2460		12%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160	10	9	8
	02	12	-	-	-	-	-	-	-	-	12	-	-	-	240	6	8	12
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	+ 6%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	0%
	'97	300		0%
	'02	320		25%

Juniperus osteosperma																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	2	-	-	-	-	-	-	-	-	1	-	1	-	66			2
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	-	-	5
	02	8	-	-	-	-	-	-	1	-	8	-	1	-	180	-	-	9
D	89	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	17%	-20%
'97	00%	00%	00%	+33%
'02	00%	00%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	199	Dec:	67%
	'97	160		0%
	'02	240		17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	1	-	-	-	-	-	-	-	-	1	-	-	-	33	4	15	1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	18	0
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	5	30	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'89	00%	00%	00%
'97	00%	00%	00%
'02	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	66	Dec:	-
	'97	0		-
	'02	20		-

Purshia tridentata																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	4	10	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor
'89	00%	00%	00%
'97	00%	00%	00%
'02	00%	00%	00%

%Change

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	0		-
	'02	0		-